1. A luminescent semiconductor nanocrystal compound capable of linking to an affinity molecule and capable of emitting electromagnetic radiation in a narrow wavelength band when excited comprising:

a) a semiconductor nanocrystal capable of emitting light in a narrow wavelength band when excited; and

b) at least one linking agent linked to said semiconductor nanocrystal and capable of linking to said affinity molecule.

2. The luminescent semiconductor nanocrystal compound of claim 1 wherein said semiconductor nanocrystal is capable of absorbing energy over a wide bandwidth.

3. The luminescent semiconductor nanocrystal compound of claim 1 wherein said linking agent includes a glass coating on said semiconductor nanocrystal capable of being linked to said affinity molecule through a further linking agent capable of linking to both said glass coating and said affinity molecule .

4. The luminescent semiconductor nanocrystal compound of claim 1 wherein said glass coating on said semiconductor nanocrystal comprises a coating of silica glass.

5. The luminescent semiconductor nanocrystal compound of claim 1 wherein said linking agent comprise a first portion linked to said semiconductor nanocrystal and a second portion capable of linking to said affinity molecule.

6. The luminescent semiconductor nanocrystal compound of claim 1 wherein said one or more linking agents comprises a glass coating on said semiconductor nanocrystal and a linking material having a first portion linked to said glass coating on said semiconductor nanocrystal and a second portion capable of linking to said affinity molecule.

7. An organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of emitting electromagnetic radiation in a narrow wavelength band when excited, comprising a luminescent semiconductor nanocrystal compound linked to an affinity molecule capable of bonding to said detectable substance.

8. An organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of emitting electromagnetic radiation in a narrow wavelength band when excited comprising:

a) a semiconductor nanocrystal capable of emitting electromagnetic radiation in a narrow wavelength band when excited;

b) at least one linking agent linked to said semiconductor nanocrystal and having a second portion capable of linking to an affinity molecule; and

c) an affinity molecule linked to said second portion of said linking agent, and capable of selectively bonding to said detectable substance;

whereby treatment of a material with said organo luminescent semiconductor nanocrystal probe, and subsequent exposure of said treated material to excitation energy to determine the presence of said detectable substance within said material will excite said semiconductor nanocrystal in said organo luminescent semiconductor nanocrystal probe bonded to said detectable substance causing the emission of electromagnetic radiation of a narrow wavelength band signifying the presence, in said material, of said detectable substance bonded to said organo luminescent semiconductor nanocrystal probe.

9. The organo luminescent semiconductor nanocrystal probe of claim 8 wherein said linking agent comprises a glass coating on said semiconductor nanocrystal.

10. The organo luminescent semiconductor nanocrystal probe of claim 8 wherein said material treated with said organo luminescent semiconductor nanocrystal probe to determine the presence of said detectable substance comprises a biological material.

11. The organo luminescent semiconductor nanocrystal probe of claim 8 wherein said material treated with said organo luminescent semiconductor nanocrystal probe to determine the presence of said detectable substance comprises an organic material.

12. The organo luminescent semiconductor nanocrystal probe of claim 8 wherein said material treated with said organo luminescent semiconductor nanocrystal probe to determine the presence of said detectable substance comprises an inorganic material.

13. A process for forming a luminescent semiconductor nanocrystal compound capable of linking to an affinity molecule and capable of emitting electromagnetic radiation electromagnetic radiation in a narrow wavelength band when excited which comprises: linking together a semiconductor nanocrystal capable of emitting electromagnetic radiation in a narrow wavelength band when excited and a linking agent having a first portion linked to said semiconductor nanocrystal and a second portion capable of linking to an affinity molecule.

14. The process of claim 13 which further comprises forming a glass coating on said semiconductor nanocrystals and then treating said glass with a linking agent capable of linking with an affinity molecule

15. A process for forming an organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of emitting electromagnetic radiation in a narrow wavelength band when excited which comprises linking a luminescent semiconductor nanocrystal compound with an affinity molecule capable of bonding with a detectable substance.

16. A process for forming an organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of emitting electromagnetic radiation in a narrow wavelength band when excited which comprises the steps of:

a) linking a semiconductor nanocrystal capable of emitting electromagnetic radiation in a narrow wavelength band when excited with a linking agent having a first portion linked to said semiconductor nanocrystal and a second portion capable of linking to an affinity molecule; and

b) linking said linking agent and an affinity molecule capable of bonding with said detectable substance.

17. The process of claim 16 wherein said step of linking together said semiconductor nanocrystal and said linking agent is carried out prior to said step of linking together said linking agent and said affinity molecule.

18. The process of claim 16 wherein said step of linking together said linking agent and said more affinity molecule is carried out prior to said step of linking together said semiconductor nanocrystal and said linking agent.

19. The process of claim 16 wherein said step of linking together said semiconductor nanocrystal and said linking agent further comprises coating said semiconductor nanocrystal with a glass and then treating said glass-coated semiconductor nanocrystal with a linking agent capable of linking to said affinity molecule.

20. A process for treating a material to determine the presence of one or more detectable substances in said material which comprises:

a) contacting said material with a first organo luminescent semiconductor nanocrystal probe capable of bonding with a first detectable substance, if present, in said material, and capable of emitting electromagnetic radiation in a first narrow wavelength band when excited, said first organo luminescent semiconductor nanocrystal probe comprising:

i) a first semiconductor nanocrystal capable of being excited over a broad bandwidth and capable of emitting electromagnetic radiation in said first narrow wavelength band when excited;

ii) an affinity molecule capable of selectively bonding to said detectable substance; and

iii) a linking agent linked to said first semiconductor nanocrystal and also linked to said affinity molecule;

b) removing, from said material, portions of said first organo luminescent semiconductor nanocrystal probe not bonded to said first detectable substance; and

c) exposing said material to energy capable of exciting said first semiconductor nanocrystal to emit electromagnetic radiation in said first narrow wavelength band, indicative of the presence of said first detectable substance in said material; and

d) detecting said electromagnetic radiation in said first narrow wavelength band emitted by said first semiconductor nanocrystal in said first organo luminescent semiconductor nanocrystal probe.

21. The process of claim 20 which includes the further step of treating said material with at least a second organo luminescent semiconductor nanocrystal probe capable of bonding to an additional detectable substance in said material, and containing a second semiconductor nanocrystal capable of being excited over a broad bandwidth and capable of emitting electromagnetic radiation in a second narrow wavelength band different from said first narrow wavelength band, whereby the exposure of said material to energy capable of exciting both said first and second nanocrystals will cause any of said first or second semiconductor nanocrystals present in said material to emit electromagnetic radiation of differing narrow wavelength bands, whereby the presence or absence of more than one detectable substance in a material may be simultaneously detected using a single excitation energy source.

22. The process of claim 21 wherein at least one further organo luminescent semiconductor nanocrystal probe is used to treat said material, with each of said organo luminescent semiconductor nanocrystal probes selectively bondable to a different detectable substance and each of said organo luminescent semiconductor nanocrystal probes capable of being excited over a broad bandwidth and capable of emitting electromagnetic radiation of a different narrow wavelength band, whereby a plurality of detectable substances may be simultaneously analyzed for in a material using a single excitation source.

23. The process of claim 21 wherein said material is treated with all of said organo luminescent semiconductor nanocrystal probes prior to said step of removing, from said material, portions of said first organo luminescent semiconductor nanocrystal probe not bonded to said first detectable substance, and said step of removing further comprises removing portions of all of said organo luminescent semiconductor nanocrystal probes not bonded to a detectable substance in said material.

24. The process of claims 21, 22, or 23, whereby the exposure of the material to light of a selected wavelength is used to excite selectively one or more, but not all, of said organo luminescent semiconductor nanocrystal probes, thus allowing identification of the presence of specific labelled detectable substances, or subsets of different labelled detectable substances in said material.

25. The process for treating a material of claim 20 wherein said material comprises a biological material.

26. The process for treating a material of claim 20 wherein said step of exposing said material to energy capable of exciting said first semiconductor nanocrystal to emit electromagnetic radiation further comprises exposing said material to a source of electromagnetic radiation capable of emitting photons of a broad or narrow spectrum.

27. The process for treating a material of claim 20 wherein said step of exposing said material to energy capable of exciting said first semiconductor nanocrystal to emit electromagnetic radiation further comprises exposing said material to an electron beam.

28. A process for treating a material to determine the presence of a detectable substance in said material which comprises:

a) contacting said material with an organo luminescent semiconductor nanocrystal probe capable of bonding with a first detectable substance, if present, in said material, and capable of absorbing energy when excited, said organo luminescent semiconductor nanocrystal probe comprising:

i) a semiconductor nanocrystal capable of being excited over a broad bandwidth and capable of absorbing energy when excited;

ii) an affinity molecule capable of selectively bonding to said detectable substance; and

iii) a linking agent linked to said first semiconductor nanocrystal and also linked to said affinity molecule;

b) removing, from said material, portions of said organo luminescent semiconductor nanocrystal probe not bonded to said first detectable substance; and

c) exposing said material to energy capable of exciting said first semiconductor nanocrystal to absorb energy, indicative of the presence of said first detectable substance in said material; and

d) detecting the change in absorbed energy, indicative of the presence of said organo luminescent semiconductor nanocrystal probe in said material bonded to said detectable substance.

29. The process of claim 28 which includes the further step of treating said material with at least a second organo luminescent semiconductor nanocrystal probe capable of bonding to an additional detectable substance in said material, and containing a second semiconductor nanocrystal capable of being excited over a broad bandwidth resulting in a detectable change in absorbance, and whereby the exposure of said material to energy capable of exciting both said first and second nanocrystals will cause any of said first or second semiconductor nanocrystals present in said material to absorb electromagnetic radiation of differing wavelength bands, whereby the presence or absence of more than one detectable substance in a material may be simultaneously detected using a single excitation energy source.

30. The process of claim 29 wherein at least one further organo luminescent semiconductor nanocrystal probe is used to treat said material, with each of said organo luminescent semiconductor nanocrystal probes selectively bondable to a different detectable substance and each of said organo luminescent semiconductor nanocrystal probes capable of being excited over a broad bandwidth and capable of absorbing electromagnetic radiation, whereby a plurality of detectable substances may be simultaneously analyzed for in a material using a single excitation source.

31. The process for treating a material of claim 28 wherein said step of exposing said material to energy capable of exciting said first semiconductor nanocrystal to emit electromagnetic radiation further comprises exposing said material to a source of electromagnetic radiation capable of emitting photons of a broad or narrow spectrum.

32. The process for treating a material of claim 28 wherein said step of exposing said material to energy capable of exciting said first semiconductor nanocrystal to emit electromagnetic radiation further comprises exposing said material to an X-ray source.

33. A process for treating a material to determine the presence of a detectable substance in said material which comprises:

a) contacting said material with an organo luminescent semiconductor nanocrystal probe capable of bonding with a first detectable substance, if present, in said material, and capable of scattering or diffracting energy when excited, said organo luminescent semiconductor nanocrystal probe comprising:

i) a semiconductor nanocrystal capable of scattering or diffracting energy over a broad bandwidth with a characteristic cross-section;

ii) an affinity molecule capable of selectively bonding to said detectable substance; and

iii) a linking agent linked to said first semiconductor nanocrystal and also linked to said affinity molecule;

b) removing, from said material, portions of said organo luminescent semiconductor nanocrystal probe not bonded to said first detectable substance; and

c) exposing said material to energy capable of exciting said first semiconductor nanocrystal to scatter or diffract energy, indicative of the presence of said first detectable substance in said material; and

d) detecting the change in scattered or diffracted energy, indicative of the presence of said organo luminescent semiconductor nanocrystal probe in said material bonded to said detectable substance.

34. The process of claim 33 which includes the further step of treating said material with at least a second organo luminescent semiconductor nanocrystal probe capable of bonding to a second detectable substance in said material, and containing a second semiconductor nanocrystal also capable of scattering or diffracting energy, resulting in a detectable change in scattering cross-section, and whereby the exposure of said material to energy capable of scattering or diffracting from both said first and second nanocrystals will cause any of said first or second semiconductor nanocrystals present in said material to scatter or diffract energy with scattering cross sections characteristic of the particular organo luminescent semiconductor nanocrystal probe, whereby the presence or absence of more than one detectable substance in a material may be simultaneously detected using a single excitation energy source.

35. The process of claim 34 wherein at least one further organo luminescent semiconductor nanocrystal probe is used to treat said material, with each of said organo luminescent semiconductor nanocrystal probes selectively bondable to a different detectable substance and each of said organo luminescent semiconductor nanocrystal probes exhibiting a different scattering cross section and capable of scattering or diffracting energy, whereby a plurality of detectable substances may be simultaneously analyzed for in a material using a single excitation source.

36. The process for treating a material of claim 33 wherein said step of exposing said material to energy capable of exciting said first semiconductor nanocrystal to scatter or diffract energy further comprises exposing said material to an electron beam or other particle beam.

37. The process for treating a material of claim 33 wherein said step of exposing said material to energy capable of exciting said first semiconductor nanocrystal to scatter or diffract energy further comprises exposing said material to an X-ray source.

38. The process for treating a material of claim 33 wherein said step of exposing said materials to energy capable of causing said first semiconductor nanocrystal to scatter or diffract energy, and said step of detecting said scattering or diffraction of energy, are both carried out using a transmission electron microscope.

39. The process for treating a material of claim 33 wherein said step of exposing said materials to energy capable of causing said first semiconductor nanocrystal to scatter or diffract energy, and said step of detecting said scattering or diffraction of energy, are both carried out using a scanning electron microscope.

40. A luminescent semiconductor nanocrystal compound capable of linking to an affinity molecule and capable of absorbing energy in a narrow wavelength band when excited comprising:

a) a semiconductor nanocrystal capable of absorbing energy in a narrow wavelength band when excited; and

b) at least one linking agent linked to said semiconductor nanocrystal and capable of linking to said affinity molecule.

41. A luminescent semiconductor nanocrystal compound capable of linking to an affinity molecule and capable of scattering or diffracting energy in a narrow wavelength band when excited comprising:

a) a semiconductor nanocrystal capable of scattering or diffracting energy in a narrow wavelength band when excited; and

b) at least one linking agent linked to said semiconductor nanocrystal and capable of linking to said affinity molecule.

42. An organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of absorbing energy in a narrow wavelength band when excited, comprising a luminescent semiconductor nanocrystal compound linked to an affinity molecule capable of bonding to said detectable substance.

43. An organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of absorbing energy in a narrow wavelength band when excited comprising:

a) a semiconductor nanocrystal capable of absorbing energy in a narrow wavelength band when excited;

b) at least one linking agent linked to said semiconductor nanocrystal and having a second portion capable of linking to an affinity molecule; and

c) an affinity molecule linked to said second portion of said linking agent, and capable of selectively bonding to said detectable substance;

whereby treatment of a material with said organo luminescent semiconductor nanocrystal probe, and subsequent exposure of said treated material to excitation energy to determine the presence of said detectable substance within said material will excite said semiconductor nanocrystal in said organo luminescent semiconductor nanocrystal probe bonded to said detectable substance causing the absorption of energy of a narrow wavelength band signifying the presence, in said material, of said detectable substance bonded to said organo luminescent semiconductor nanocrystal probe.

44. An organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of scattering or diffracting energy in a narrow wavelength band when excited, comprising a luminescent semiconductor nanocrystal compound linked to an affinity molecule capable of bonding to said detectable substance.

45. An organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of scattering or diffracting energy in a narrow wavelength band when excited comprising:

a) a semiconductor nanocrystal capable of scattering or diffracting energy in a narrow wavelength band when excited;

b) at least one linking agent linked to said semiconductor nanocrystal and having a second portion capable of linking to an affinity molecule; and

c) an affinity molecule linked to said second portion of said linking agent, and capable of selectively bonding to said detectable substance;

whereby treatment of a material with said organo luminescent semiconductor nanocrystal probe, and subsequent exposure of said treated material to excitation energy to determine the presence of said detectable substance within said material will excite said semiconductor nanocrystal in said organo luminescent semiconductor nanocrystal probe bonded to said detectable substance causing the scattering or diffracting of energy of a narrow wavelength band signifying the presence, in said material, of said detectable substance bonded to said organo luminescent semiconductor nanocrystal probe.

46. A process for forming a luminescent semiconductor nanocrystal compound capable of linking to an affinity molecule and capable of absorbing energy in a narrow wavelength band when excited which comprises: linking together a semiconductor nanocrystal capable of absorbing energy in a narrow wavelength band when excited and a linking agent having a first portion linked to said semiconductor nanocrystal and a second portion capable of linking to an affinity molecule.

47. A process for forming a luminescent semiconductor nanocrystal compound capable of linking to an affinity molecule and capable of scattering or diffracting energy in a narrow wavelength band when excited which comprises: linking together a semiconductor nanocrystal capable of scattering or diffracting energy in a narrow wavelength band when excited and a linking agent having a first portion linked to said semiconductor nanocrystal and a second portion capable of linking to an affinity molecule.

48. A process for forming an organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of absorbing energy in a narrow wavelength band when excited which comprises linking a luminescent semiconductor nanocrystal compound with an affinity molecule capable of bonding with a detectable substance.

49. A process for forming an organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of absorbing energy in a narrow wavelength band when excited which comprises the steps of:

a) linking a semiconductor nanocrystal capable of absorbing energy in a narrow wavelength band when excited with a linking agent having a first portion linked to said semiconductor nanocrystal and a second portion capable of linking to an affinity molecule; and

b) linking said linking agent and an affinity molecule capable of bonding with said detectable substance.

50. A process for forming an organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of scatterin or diffracting energy in a narrow wavelength band when excited which comprises linking a luminescent semiconductor nanocrystal compound with an affinity molecule capable of bonding with a detectable substance.

51. A process for forming an organo luminescent semiconductor nanocrystal probe capable of bonding with a detectable substance and capable of scattering or diffracting energy in a narrow wavelength band when excited which comprises the steps of:

a) linking a semiconductor nanocrystal capable of scattering or diffracting energy in a narrow wavelength band when excited with a linking agent having a first portion linked to said semiconductor nanocrystal and a second portion capable of linking to an affinity molecule; and

b) linking said linking agent and an affinity molecule capable of bonding with said detectable substance.

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